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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/565,653 | 01/24/2006 | Koichi Kanaya | 126247 | 6147 |

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| EXAMINER | |
|---|---|
| CHEN, KEATH T | |
| **ART UNIT** | **PAPER NUMBER** |
| 1792 | |

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|---|---|
| 01/14/2009 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/565,653 | KANAYA ET AL. | |
| | Examiner | Art Unit | |
| | KEATH T. CHEN | 1792 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *18 December 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *20 and 21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *20-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☒ Interview Summary (PTO-413) Paper No(s)/Mail Date. *20090106* .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/18/2008 has been entered.

### *Response to Amendment*

1. The claim amendment filed on 12/18/2008, addressing claim 9-12, 15, and 16 rejections from the final office action (09/18/2008), by canceling claims 9-12, 15, and 16, and adding new claims 20 and 21 is acknowledged and will be addressed below.

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 20-21 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 20 recites the limitation of "by maintaining the maximum depth to be less than 0.4 mm", there is lack of support of this limitation.

***Claim Rejections - 35 USC § 103***

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

**3. Claims 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kokusai (JP 2000355766 a second English Translation as of 03/10/2008, hereafter '766), in view of Murakami (US 5088697, hereafter '697), Yao et al. (US 2002/0066412, hereafter '412), and Matossian et al. (US 5303574, hereafter '574).**

'766 teaches some limitations of:

Claim 20: A method of vapor phase growth with reduced slip dislocation frequency, comprising: providing a silicon single crystal substrate ([0003], epitaxial growth has to be on single crystal), the substrate having a main surface (Fig. 3, #5, the top of #5 is a main surface) and a rear surface (the bottom surface); using a susceptor having only a heat treated body section ("heat treated body section" is considered a product-by-process claim, Zagury process produces the same product limitation) formed of Carbon (instead of graphite) and coated with silicon carbide (SIC) (abstract), wherein after heat treatment (Zagury process produces the same product limitation) the body section is warped along its longitudinal length in an inverted U-shape (as shown in Fig. 2); a pocket formed on the susceptor (as shown in Figs. 2 and 4), the susceptor pocket having an outer peripheral side part (Fig. 2, the outside of #31 which is near the substrate #5) which is capable of supporting the rear surface of the silicon single crystal

substrate (as shown in Figs. 2 and 4) and an inner peripheral side part (Fig. 2, the inside of #31) defining a bottom surface which is kept in a state of being more recessed than the outer peripheral side part in an inside of the outer peripheral side part (as shown in Figs. 2 and 4); the pocket having an initial maximum depth D defined between the bottom surface of the inner peripheral side part in the pocket and a plane defining the location of the rear surface of the silicon single crystal substrate when mounted on the outer peripheral side part over the pocket (pocket intrinsically having depth D), and after the heat treatment having a reduced pocket depth (D - $\beta$) that has been reduced due to the inverted U-shape warping by warping amount $\beta$ to be less than 0.4 mm (Zagury process produces the same product limitation; as shown in Table I, well below 0.4 mm); mounting the silicon single crystal substrate on the outer peripheral side part of the susceptor over the pocket (as shown in Figs. 2 and 4); and performing a vapor phase growth of a silicon epitaxial layer ([0001]) on the main surface of the substrate with reduced slip dislocation frequency (intrinsic property of the apparatus/product).

Claim 21: The method as claimed in claim 20, wherein the susceptor is a type of a single wafer (Fig. 2, each secondary susceptor #17 holds one wafer #5), and a curvature on a rear surface side of the susceptor is $1.75 \times 10^{-5}$ $mm^{-1}$ or less (Based on the information in Table 1 of '766, an 8 inch wafer with an 85 $\mu$m depth crevice is equivalent to a curvature of $1.7 * 10^{-5}$ $mm^{-1}$, therefore, '766 taught the limitations of claim 7).

'766 does not teach the limitations of:

Claim 21: (a silicon single crystal substrate) of 300 mm or more, selecting a susceptor having only a heat treated body section formed of graphite and coated with silicon carbide, (with reduced slip dislocation frequency) by maintaining the maximum depth to be less than 0.4 mm.

'697 is an analogous art in the field of CVD (abstract), particularly in eliminating the bad effect on the exposed portion of the susceptor (col. 2, lines 27-31). '697 teaches that graphite is normally used for susceptor because its workability (col. 3, lines 36-38).

'412 is an analogous art in the field of chemical vapor deposition, specifically for processing a semiconductor substrate that minimizes contact with the backside of the substrate. '412 provides the gap depth at a range of 0.15 to 0.5 mm for 300 mm wafers (bottom of [0029]), preferably at 0.25 mm.

'574 is an analogous art in the field of articles used in manufacturing tool, particularly in wear of tool (title, abstract). '574 teaches checking dimensions periodically (col. 1, lines 53-65) with initial inspection (selecting) and subsequent measurement and discarding part not meet tolerance (maintaining).

At the time of the invention was made, it would have been obvious to a person of ordinary skill in the art to have adopted graphite as susceptor material as taught by '697 in the apparatus of Fig. 2 of '766, for the purpose of workability; furthermore, to have adopted the range provided by '412 and incorporated a 0.25 mm gap depth to the pocket #31 in Fig. 2 of '766, in a susceptor for 300 mm wafers, with a reasonable

expectation of success and the expectation of similar results. The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in Sinclair & Carroll Co. v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 (1945) (MPEP 2144.07); and still furthermore, to have initially inspect and subsequently checking the dimension tolerance (selecting and maintaining) of the manufacturing parts, as taught by '574, for the purpose to evaluate tool wear and ensure useful life to tools.

The examiner regards the above claim language of the susceptor as a product-by-process claim because claim 20 recites "selecting a susceptor having …", instead of the process of making the susceptor.

In case Applicants argue the form of claim language is method claim, claims 20-21 are rejected in an alternative form below.

**4. Alternatively, Claims 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over '766, '697, '412, and '574, in view of Yukio et al. (JP 07-335572, hereafter '572).**

'766, '697, '412, and '574, together, teach all limitations of claims 20 and 21 as a product-by-process susceptor, as discussed above.

'766, '697, '412, and '574, together, do not teach the limitations of:

Claim 20: heat treatment and "after the heat treatment having a reduced pocket depth (D - β) that has been reduced due to the inverted U-shape warping by warping amount β to be less than 0.4 mm".

'572 is an analogous art in the field of CVD eptiaxial ([0002]), particularly in reducing slip ([0017]) by providing a depth/crevice to the susceptor ([0018]). '572 teaches heat treatment after mechanical polishing ([0025]).

At the time of the invention was made, it would have been obvious to a person of ordinary skill in the art to have followed the mechanical Zagury process with a heat treatment process, as taught by '572 ([0025]), for the purpose of reducing trap impurity (see [0031] and table II for example). The heat treatment will produce dimension variation and the inspection (as taught by '574) of the design parameter (as taught by '412) would have selected pocket depth of less than 0.4 mm.

### *Response to Arguments*

Applicant's arguments with respect to claims 20-21 have been considered but are unconvincing in view of the new ground(s) of rejection.

### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KEATH T. CHEN whose telephone number is (571)270-1870. The examiner can normally be reached on 6:30AM-3 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/K. T. C./
Examiner, Art Unit 1792

/Michael Cleveland/
Supervisory Patent Examiner, Art Unit 1792